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ABSTRACT

This document, which is intended for use by community and junior colleges throughout Mississippi, contains curriculum frameworks for the course sequences in the plumber and pipefitter/steamfitter cluster. Presented in the introductory section are program descriptions and suggested course sequences for the plumbing and pipefitting programs. Section I lists baseline competencies for each program. Section II consists of course outlines for each course in the following sequences: plumbing and pipefitting (fundamentals of plumbing/pipefitting, blueprint reading for piping trades, sketching, and low-pressure boilers); pipefitting (tacking, brazing, and burning; basic pipe fabrication, pipe specifications and systems, rigging and signaling, advanced pipefitting lab, steel ship building and marine construction, special project in pipefitting and work-based learning in pipefitting); and plumbing (gas piping, drainage and sewer systems, plumbing fixtures lab, back flow cross connection, advanced plumbing lab, heating devices, domestic systems, piping level/transit, special project in plumbing, and work-based learning in plumbing). Each course outline contains some/all of the following: course name and abbreviation; course classification; course description; prerequisites; and competencies and suggested objectives. Recommended tools and equipment are listed in section III. Appended are lists of related academic topics and workplace skills for the 21st century and student competency profiles for both courses. (MN)

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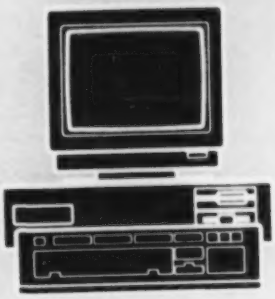
Mississippi Curriculum Framework for Plumber and Pipefitter/ Steamfitter Cluster

ED 397 304



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Postsecondary Vocational and Technical Education 1996

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MISSISSIPPI

CURRICULUM FRAMEWORK

FOR

PLUMBER AND PIPEFITTER/STEAMFITTER

(PROGRAM CIP: 46.0501 - PLUMBER AND PIPEFITTER)

POSTSECONDARY PROGRAMS 1996

July 30, 1996

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FOREWORD

In order to survive in today's global economy, businesses and industries have had to adopt new practices and procedures. Total quality management, statistical process control, participatory management, and other concepts of high performance work organizations are practices by which successful companies survive. Employers now expect their employees to be able to read, write, and communicate effectively; solve problems and make decisions; and interact with the technologies that are prevalent in today's workplace. Vocational-technical education programs must also adopt these practices in order to provide graduates who can enter and advance in the changing work world.

The curriculum framework in this document reflects these changes in the workplace and a number of other factors that impact on local vocational-technical programs. Federal and state legislation calls for articulation between high school and community college programs, integration of academic and vocational skills, and the development of sequential courses of study that provide students with the optimum educational path for achieving successful employment. National skills standards, developed by industry groups and sponsored by the U. S. Departments of Education and Labor, provide vocational educators with the expectations of employers across the United States. All of these factors are reflected in the framework found in this document.

Each postsecondary program of instruction consists of a program description and a suggested sequence of courses which focus on the development of occupational competencies. Each vocational-technical course in this sequence has been written using a common format which includes the following components:

- Course Name - A common name that will be used by all community/junior colleges in reporting students.

- Course Abbreviation - A common abbreviation that will be used by all community/junior colleges in reporting students.

- Classification - Courses may be classified as:
  - Vocational-technical core - A required vocational-technical course for all students.
  - Vocational-technical elective - An elective vocational-technical course.
  - Related academic course - An academic course which provides academic skills and knowledge directly related to the program area.
  - Academic core - An academic course which is required as part of the requirements for an Associate degree.

- Description - A short narrative which includes the major purpose(s) of the course and the recommended number of hours of lecture and laboratory activities to be conducted each week during a regular semester.

- Prerequisites - A listing of any prerequisite courses that must be taken prior to or on enrollment in the course.

- Competencies and Suggested Objectives - A listing of the competencies (major concepts and performances) and of the suggested student objectives that will enable students to demonstrate mastery of these competencies.

The following guidelines were used in developing the program(s) in this document and should be considered in compiling and revising course syllabi and daily lesson plans at the local level:

- The content of the courses in this document reflects approximately 75 percent of the time allocated to each course. For example, in a four semester hour course consisting of 30 hours lecture and 120 hours of laboratory activities, approximately 22 hours of lecture and 90 hours of lab should be taken by the competencies and suggested objectives identified in the course framework. The remaining 25 percent of each course should be developed at the local district level and may reflect:
  - Additional competencies and objectives within the course related to topics not found in the State framework, including activities related to specific needs of industries in the community college district.
  - Activities which develop a higher level of mastery on the existing competencies and suggested objectives.
  - Activities and instruction related to new technologies and concepts that were not prevalent at the time the current framework was developed/revised.
  - Activities which implement components of the Mississippi Tech Prep initiative, including integration of academic and vocational-technical skills and coursework, school-to-career transition activities, and articulation of secondary and postsecondary vocational-technical programs.
  - Individualized learning activities, including worksite learning activities, to better prepare individuals in the courses for their chosen occupational area.

- Sequencing of the course within a program is left to the discretion of the local district. Naturally, foundation courses related to topics such as safety, tool and equipment usage, and other fundamental skills should be taught first. Other courses related to specific skill areas and related academics, however, may be sequenced to take advantage of seasonal and climatic conditions, resources located outside of the school, and other factors.

- Programs that offer an Associate of Applied Science degree must include a minimum 15 semester credit hour academic core. Specific courses to be taken within this core are to be determined by the local district. Minimum academic core courses are as follows:
  - 3 semester credit hours — Math/Science Elective
  - 3 semester credit hours — Written Communications Elective
  - 3 semester credit hours — Oral Communications Elective
  - 3 semester credit hours — Humanities/Fine Arts Elective
  - 3 semester credit hours — Social/Behavioral Science Elective

  It is recommended that courses in the academic core be spaced out over the entire length of the program, so that students complete some academic and vocational-technical courses each semester. Each community/junior college has the discretion to select the actual courses that are required to meet this academic core requirement.

- In instances where secondary programs are directly related to community and junior college programs, competencies and suggested objectives from the high school programs are listed as Baseline Competencies. These competencies and objectives reflect skills and knowledge that are directly related to the community and junior college vocational-technical program. In adopting the curriculum framework, each community and junior college is asked to give assurances that:
  - students who can demonstrate mastery of the Baseline Competencies do not receive duplicate instruction, and
  - students who cannot demonstrate mastery of this content will be given the opportunity to do so.

- The roles of the Baseline Competencies are to:
  - Assist community/junior college personnel in developing articulation agreements with high schools, and
  - Ensure that all community and junior college courses provide a higher level of instruction than their secondary counterparts

- The Baseline Competencies may be taught as special "Introduction" courses for 3-6 semester hours of institutional credit which will not count toward Associate degree requirements. Community and junior colleges may choose to integrate the Baseline Competencies into ongoing courses in lieu of offering the "Introduction" courses or may offer the competencies through special projects or individualized instruction methods.

- Technical elective courses have been included to allow community colleges and students to customize programs to meet the needs of industries and employers in their area.

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PLUMBER AND PIPEFITTER/STEAMFITTER
FRAMEWORK OF COURSES AND PROGRAMS

COURSES	AREAS OF CONCENTRATION (AOC) Plumbing	Pipefitting
Vocational-Technical Core		
Fundamentals of Plumbing/Pipefitting	X	X
Blueprint Reading for Piping Trades	X	X
Sketching	X	X
Low Pressure Boilers	X	X
Pipefitting Courses		
Tacking, Brazing, and Burning	E	X
Basic Pipe Fabrication		X
Pipe Specifications and Systems		X
Rigging and Signaling	E	X
Advanced Pipefitting Lab		X
Steel Ship Building and Marine Construction		E
Special Project in Pipefitting		E
Work-Based Learning in Pipefitting		E
Plumbing Courses		
Gas Piping	X	
Drainage and Sewer Systems	X	E
Plumbing Fixtures Lab	X	E
Back Flow Cross Connection	X	
Advanced Plumbing Lab	X	
Heating Devices	X	
Domestic Systems	X	E
Piping Level/Transit	X	
Special Project in Plumbing	E	
Work-Based Learning in Plumbing	E	

Note: X - required course; E - elective

PROGRAM DESCRIPTION

PLUMBER AND PIPEFITTER/STEAMFITTER CLUSTER

The Plumber and Pipefitter/Steamfitter program includes a basic core of courses designed to prepare a student for a variety of entry-level positions through selection of a concentration in the following areas: Plumbing and Pipefitting.

Upon successful completion of a minimum of 32 semester hours of approved credit, the student will be eligible to receive a certificate.

July 30, 1996

PLUMBER AND PIPEFITTER/STEAMFITTER CLUSTER

PIPEFITTING CONCENTRATION

SUGGESTED COURSE SEQUENCE*

Baseline Competencies for Plumber and Pipefitter/Steamfitter**

FIRST YEAR

3 sch	Fundamentals of Plumbing/Pipefitting (PPV 1113)	2 sch	Pipe Specifications and Systems (PPV 1432)
3 sch	Tacking, Brazing, and Burning (PPV 1213)	2 sch	Rigging and Signaling (PPV 1812)
3 sch	Blueprint Reading for Piping Trades (PPV 1313)	6 sch	Vocational-Technical Electives†
3 sch	Sketching (PPV 1323)	6 sch	Advanced Pipefitting Lab (PPV 1456)
1 sch	Low Pressure Boilers (PPV 1411)	16 sch	
3 sch	Basic Pipe Fabrication (PPV 1423)		
16 sch			

* Students who lack entry level skills in math, English, science, etc., will be provided related studies.

** Baseline competencies are taken from the high school Building Trades program. Students who can document mastery of these competencies should not receive duplicate instruction. Students who cannot demonstrate mastery will be required to do so.

† VOCATIONAL-TECHNICAL ELECTIVES

3 sch	Steel Ship Building and Marine Construction (PPV 1823)
1-3 sch	Special Project in Pipefitting [PPV 291(1-3)]
1-6 sch	Work-Based Learning in Pipefitting [PPV 292(1-6)]
2 sch	Domestic Systems (PPV 1712)
3 sch	Drainage and Sewer Systems (PPV 1513)
2 sch	Plumbing Fixtures Lab (PPV 1722)

July 30, 1996

PLUMBER AND PIPEFITTER/STEAMFITTER CLUSTER

PLUMBING CONCENTRATION

SUGGESTED COURSE SEQUENCE*

Baseline Competencies for Plumber and Pipefitter/Steamfitter**

FIRST YEAR

3 sch	Fundamentals of Plumbing/Pipefitting (PPV 1113)	2 sch	Low Pressure Boilers (PPV 1411)
3 sch	Drainage and Sewer Systems (PPV 1513)	3 sch	Vocational-Technical Elective†
2 sch	Plumbing Fixtures Lab (PPV 1722)	3 sch	Blueprint Reading for Piping Trades (PPV 1313)
2 sch	Back Flow Cross Connection (PPV 1732)	3 sch	Piping Level/Transit (PPV 1443)
2 sch	Gas Piping (PPV 1622)	3 sch	Advanced Plumbing Lab (PPV 1743)
2 sch	Heating Devices (PPV 1612)	3 sch	Sketching (PPV 1323)
2 sch	Domestic Systems (PPV 1712)	17 sch	
16 sch			

* Students who lack entry level skills in math, English, science, etc., will be provided related studies.

** Baseline competencies are taken from the high school Building Trades program. Students who can document mastery of these competencies should not receive duplicate instruction. Students who cannot demonstrate mastery will be required to do so.

† VOCATIONAL-TECHNICAL ELECTIVES

3 sch	Tacking, Brazing, and Burning (PPV 1213)
2 sch	Rigging and Signaling (PPV 1812)
1-3 sch	Special Project in Plumbing [PPV 191(1-3)]
1-6 sch	Work-Based Learning in Plumbing [PPV 192(1-6)]

SECTION I:

BASELINE COMPETENCIES

BASELINE COMPETENCIES FOR PLUMBER AND PIPEFITTER/STEAMFITTER

The following competencies and suggested objectives are taken from the publication *Mississippi Curriculum Framework for Building Trades*. These competencies and objectives represent the baseline which was used to develop the community/junior college Plumber and Pipefitter/Steamfitter courses. Students enrolled in postsecondary courses should either (1) have documented mastery of these competencies, or (2) be provided with these competencies before studying the advanced competencies in the Plumber and Pipefitter/Steamfitter program.

Baseline competencies may be integrated into existing courses in the curriculum or taught as special "Introduction" courses. The "Introduction" courses may be taught for up to six semester hours of institutional credit and may be divided into two courses. If the Baseline Competencies are to be taught as "Introduction" courses, each course should be at least 3 credit hours. The following course number(s) and description should be used:

Course Name(s): Introduction to Plumber and Pipefitter/Steamfitter, Introduction to Plumber and Pipefitter/Steamfitter I, or Introduction to Plumber and Pipefitter/Steamfitter II

Course Abbreviation(s): PPV 100(3-6), PPV 1013, PPV 1023

Classification: Vocational-Technical Core

Description: These courses contain the baseline competencies and suggested objectives from the high school Building Trades curriculum which directly relate to the community college Plumber and Pipefitter/Steamfitter program. The courses are designed for students entering the community college who have had no previous training or documented experience in the field. (3-6 semester hours based upon existing skills for each student. May be divided into 2 courses for a maximum total of 6 hours of institutional credit.)

Competencies and Suggested Objectives:

1. Apply workplace environmental safety procedures.
   a. Describe the safe use of fire extinguishers for different classes of fires.
   b. Identify standard industry Safety Color Code.
   c. Describe factors to consider in storing and/or disposing of hazardous materials.
   d. Identify hazardous materials that may be found on a job site and procedures for handling, avoiding, or removing them according to Occupational Safety and Health Administration (OSHA) regulations.
   e. Review a Materials Safety Data Sheet (MSDS).

Related Academic Topics (See Appendix A): C1, C2, C3, C4, C5, C6, S5, S8
Workplace Skills (See Appendix B): WP1, WP2, WP3, WP6

2. Identify terms, materials, and components related to plumbing trades.
   a. Define terms related to plumbing trades.
   b. Identify materials and components related to plumbing trades.

   Related Academic Topics (See Appendix A): C1, C2, C3, C4, C5, C6, S8
   Workplace Skills (See Appendix B): WP2, WP6
3. Apply procedures in plumbing.
   a. Select tools and materials for a specific task.
   b. Measure, cut, ream, and thread steel pipe.
   c. Install a polyvinyl chloride (PVC) fitting on a PVC pipe.
   d. Cut, ream, and join copper tubing.
   e. Sweat copper fittings.

   Related Academic Topics (See Appendix A): C1, C2, C3, C4, C5, C6, M4, M7, S8
   Workplace Skills (See Appendix B): WP1, WP2, WP3, WP4, WP5, WP6
4. Apply workplace environmental safety procedures.
   a. Describe the safe use of fire extinguishers for different classes of fires.
   b. Identify standard industry Safety Color Code.
   c. Describe factors to consider in storing and/or disposing of hazardous materials.
   d. Identify hazardous materials that may be found on a job site and procedures for handling, avoiding, or removing them according to Occupational Safety and Health Administration (OSHA) regulations.
   e. Review a Materials Safety Data Sheet (MSDS).

   Related Academic Topics (See Appendix A): C1, C2, C3, C4, C5, C6, S5, S8
   Workplace Skills (See Appendix B): WP1, WP2, WP3, WP6
5. Explain terms and materials related to plumbing trades.
   a. Define terms related to plumbing.
   b. Demonstrate safety rules related to plumbing.
   c. Identify the duties of a plumber.
   d. Identify types of pipe used in plumbing.

   Related Academic Topics (See Appendix A): C1, C2, C3, C4, C5, C6, M6, M7, S8
   Workplace Skills (See Appendix B): WP1, WP2, WP3, WP4, WP5, WP6
6. Join copper tubing.
   a. Select tools, materials, and equipment necessary to join copper tubing by the compression, flare, and sweat method.
   b. Join copper tubing by the compression, flare, and sweat method.

   Related Academic Topics (See Appendix A): C1, C2, C3, C4, C5, C6, M2, M4, M7, S5, S6, S8
   Workplace Skills (See Appendix B): WP1, WP2, WP3, WP4, WP5, WP6
7. Join polyvinyl chloride (PVC) pipe.
   a. Select tools and materials used to join PVC pipe.

b. Join PVC pipe and fittings.

Related Academic Topics (See Appendix A): C1, C2, C3, C4, C5, C6, M4, M7, S8

Workplace Skills (See Appendix B): WP1, WP2, WP3, WP4, WP5, WP6

8. Join steel pipe.
   a. Identify sizes of steel pipe.
   b. Identify the tools and materials used to join steel pipe.
   c. Identify basic plumbing fittings, bends, valves, and branches.
   d. Measure, cut, ream, thread, and assemble steel pipe and fitting.

   Related Academic Topics (See Appendix A): C1, C2, C3, C4, C5, C6, M1, M4, M7, S8

   Workplace Skills (See Appendix B): WP1, WP2, WP3, WP4, WP5, WP6
9. Install water and drainage plumbing systems.
   a. Install water systems according to local codes.
   b. Install PVC-DWV (Drain-Waste-Vent) system according to local codes.
   c. Install plumbing fixtures.

   Related Academic Topics (See Appendix A): C1, C2, C3, C4, C5, C6, M1, M4, M6, M7, S8

   Workplace Skills (See Appendix B): WP1, WP2, WP3, WP4, WP5, WP6

July 30, 1996

SECTION II:

CURRICULUM GUIDE

FOR

PLUMBER AND PIPEFITTER/STEAMFITTER

PLUMBING AND PIPEFITTING COURSES

Course Name: Fundamentals of Plumbing/Pipefitting

Course Abbreviation: PPV 1113

Classification: Vocational-Technical Core (Plumbing and Pipefitting)

Description: This course provides the student with an understanding of job safety and health, including first aid. It also gives the student a general knowledge of occupational hazards and the scope of the OSHA law. The course includes pipefitting and plumbing fittings, valves, hangers, and general trade fitting identification. Included are screwed, welded, flanged, soldered, brazed, glued, compression, and flared fittings. The course also consists of identification and use of pipefitting and plumbing tools used in today's piping industry. (3 sch: 1 hr. lecture, 4 hr. lab)

Prerequisites: None

Competencies and Suggested Objectives:

1. Describe personal safety rules for working in the plumbing/pipefitting industry.
   a. Identify and apply terms and definitions for safety.
   b. Identify provisions of OSHA and EPA.
   c. Identify OSHA and EPA inspections and citations.
   d. Identify why citations are given.
   e. Identify accidents, their causes, and their prevention.
   f. Identify general safety procedures.
   g. Identify causes of electrical hazards.
   h. Identify proper methods for moving heavy items.
   i. Identify and apply emergency first aid, if necessary.
   j. Identify and apply ABC's of CPR.
   k. Apply eye safety procedures.
   l. Identify and apply the provisions of hazardous materials control.
   m. Identify and safely use the tools of the industry.

   Related Academic Topics (See Appendix A): C1, C4, C5
   Workplace Skills (See Appendix B): WP2, WP3
2. Demonstrate the ability to identify and discuss the basic fittings used in the industry.
   a. Identify and discuss the use of flange fittings.
   b. Identify and discuss the use of sweat fittings.
   c. Identify and discuss the use of welded fittings.
   d. Identify and discuss the use of screwed fittings.
   e. Identify and discuss the use of plastic fusion fittings.

   Related Academic Topics (See Appendix A): C1, C4, C5
   Workplace Skills (See Appendix B): WP2, WP3

3. Demonstrate the ability to identify and safely use the basic tools and equipment.
   a. Identify the hand tools and discuss the safety factors in their use.
   b. Identify the power tools and discuss the safety factors in their use.
   c. Identify the basic equipment and discuss the safety factors in their use.

   Related Academic Topic (See Appendix A): C1, C4, C5
   Workplace Skills (See Appendix B): WP2, WP3

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Course Name: Blueprint Reading for Piping Trades

Course Abbreviations: PPV 1313

Classification: Vocational-Technical Core (Pipefitting and Plumbing)

Description: A course designed to provide the student an indepth understanding of blueprint reading. (3 sch: 1 hr. lecture, 4 hr. lab.)

Prerequisites: None

Competencies and Suggested Objectives:

1. Demonstrate the ability to identify the symbols, notes, and terms used in sketching and on piping and structural drawings.
   a. Identify terms, symbols, abbreviations, and lines used on blueprints.
   b. Interpret notes, specifications, and dimensions.
   Related Academic Topics (See Appendix A): C2, C3, C5, C6, M2, M3
   Workplace Skills (See Appendix B): WP2, WP5, WP6
2. Demonstrate the ability to interpret piping and structural blueprints.
   a. Identify the three basic views of a drawing.
   b. Identify the various lines used on drawings.
   c. Interpret dimensions and symbols.
   d. Interpret general and specific notes on drawings.
   e. Locate details on drawings.
   f. Order materials needed as interpreted from specifications/blueprints.
   g. Interpret isometric views of piping and plumbing drawings.
   Related Academic Topics (See Appendix A): C2, C3, C5, C6, M2, M3
   Workplace Skills (See Appendix B): WP2, WP5, WP6

Course Name: Sketching

Course Abbreviation: PPV 1323

Classifications: Vocational-Technical Core (Pipefitting and Plumbing)

Description: A course designed to prepare students to sketch, measure, and record required information to supplement oral descriptions and organize ideas to include individual piping components. (3 sch: 1 hr. lecture, 4 hr. lab)

Prerequisites: None

Competencies and Suggested Objectives:

1. Demonstrate the ability to sketch piping objects.
   a. Sketch isometric drawings.
   b. Sketch oblique drawings.
   c. Sketch 2-D views.
   d. Sketch the principal views.
   Related Academic Topics (See Appendix A): C2, C3, C5, M2
   Workplace Skills (See Appendix B): WP2, WP5
2. Demonstrate the ability to read different scales used on piping drawings.
   a. Discuss and demonstrate the use of the architectural scale.
   b. Discuss and demonstrate the use of the engineering scale.
   c. Discuss and demonstrate the use of the metric scale.
   Related Academic Topics (See Appendix A): C2, C3, C5, M4
   Workplace Skills (See Appendix B): WP2, WP5
3. Demonstrate the ability to do freehand lettering.
   a. Discuss and demonstrate vertical lettering.
   b. Discuss and demonstrate the letters, numbers, and fractions.
   Related Academic Topics (See Appendix A): C2, C3
   Workplace Skills (See Appendix B): WP2, WP5
4. Demonstrate the ability to sketch piping drawings.
   a. Sketch views of a pipe drawing from given data.
   b. Sketch an isometric pipe drawing from plan and necessary views.
   c. Sketch different types of piping connections.
   d. Design and sketch a piping system.
   e. Draw pipe from a template.
   Related Academic Topics (See Appendix A): C2, C3, C5, C6, M2
   Workplace Skills (See Appendix B): WP2, WP5, WP6

Course Name: Low Pressure Boilers

Course Abbreviation: PPV 1411

Classification: Vocational-Technical Core (Pipefitting and Plumbing)

Description: This course is designed to provide students with the safe operation of a low pressure boiler for heating, steam, and water heating. (1 sch: 2 hr. lab)

Prerequisites: None

Competencies and Suggested Objectives:

1. Demonstrate the ability to identify and explain boiler fittings and accessories, including thermo expansion devices.
   a. Discuss the types of boilers.
   b. Identify and explain various boiler, steam, and hot water fittings and piping.
   c. Identify and explain feed water accessories.
   d. Identify and explain steam and hot water accessories.

   Related Academic Topics (See Appendix A): C2, C3, M2
   Workplace Skills (See Appendix B): WP2, WP5
2. Demonstrate the ability to identify and explain the operations of a boiler.
   a. Explain the operation of the draft controls.
   b. Explain the water treatment procedures.
   c. Explain the operations of a boiler
   d. Identify and explain boiler safety.

   Related Academic Topics (See Appendix A): C2, C3, M2
   Workplace Skills (See Appendix B): WP2, WP5

PIPEFITTING COURSES

July 30, 1996

Course Name: Tacking, Brazing, and Burning

Course Abbreviation: PPV 1213

Classification: Vocational-Technical Core (Pipefitting), Vocational-Technical Elective (Plumbing)

Description: This course consists of instruction in striking an arc, tacking metal together, setting up an oxyacetylene torch and burning, brazing and soldering, and cutting straight and bevel angles on flat steel and pipe. Also, instruction in safety procedures will be covered. (3 sch: 1 hr. lecture, 4 hr. lab)

Prerequisites: None

Competencies and Suggested Objectives:

1. Demonstrate the ability to safely set up and use the electric arc machine and the oxyacetylene torch.
   a. Lay out and set up the electric arc machine.
   b. Test the electric arc machine to ensure proper setup.
   c Lay out and set up the oxyacetylene cutting torch.
   d. Test the oxyacetylene torch to ensure proper setup.
   Related Academic Topic (See Appendix A): C1, C4, C5
   Workplace Skills (See Appendix B): WP2, WP3
2. Demonstrate the ability to safely cut various shapes on steel and pipe.
   a. Perform a square cut on steel and pipe with the oxyacetylene torch.
   b. Perform a bevel cut on steel and pipe with the oxyacetylene torch.
   Related Academic Topic (See Appendix A): C1, C4, C5
   Workplace Skills (See Appendix B): WP2, WP3, WP6
3. Demonstrate the ability to safely tack weld plate with the use of various rods and positions.
   a. Using an E-6010 rod, tack weld flat open butt (bevel) joints.
   b. Using an E-7018 rod, tack weld flat open butt (bevel) joints.
   c. Using an E-6010 rod, tack weld horizontal open butt (bevel) joints.
   d. Using an E-7018 rod, tack weld horizontal open butt (bevel) joints.
   e. Using an E-6010 rod, tack weld vertical open butt (bevel) joints.
   f. Using an E-7018 rod, tack weld vertical open butt (bevel) joints.
   Related Academic Topic (See Appendix A): C1, C4, C5
   Workplace Skills (See Appendix B): WP2, WP3, WP5, WP6
4. Demonstrate the ability to safely tack weld pipes in different positions.
   a. Tack weld pipe in a horizontal position.
   b. Tack weld pipe in a vertical position.

d. Tack weld pipe in an overhead position at 45 degree angle (6G position).

Related Academic Topic (See Appendix A): C1, C4, C5

Workplace Skills (See Appendix B): WP2, WP3, WP5, WP6

5. Demonstrate the ability to safely prepare, solder, braze, and test various joints.
   a. Prepare and solder a joint.
   b. Prepare and braze a joint.
   c. Perform tests on all soldered and brazed joints.

   Related Academic Topics (See Appendix A): C2, C3, C5, M2

   Workplace Skills (See Appendix B): WP2, WP5, WP6

Course Name: Basic Pipe Fabrication

Course Abbreviation: PPV 1423

Classification: Vocational-Technical Core (Pipefitting)

Description: This course is designed to provide students with the use of pipefitting tools and equipment, different ways of cutting and fitting pipes, methods of calculating pipe fittings, and various types of fit-ups for different types of pipe. (3 sch: 1 hr. lecture, 4 hr. lab)

Prerequisites: None

Competencies and Suggested Objectives:

1. Develop the ability to identify and safely use pipefitting tools and equipment.
   a. Explain the safe use of tools and equipment.
   b. Identify the proper tools for each specific task.
   c. Identify and explain the use of the equipment for each specific task.

   Related Academic Topics (See Appendix A): C2, C3
   Workplace Skills (See Appendix B): WP2, WP5
2. Demonstrate the ability to safely fabricate various pipe assemblies.
   a. Describe methods for preparing different types of pipe for fabrication.
   b. Estimate fitting take-out.
   c. Fabricate a butt weld pipe assembly.
   d. Fabricate a socket weld pipe assemble.
   e. Fabricate a screw pipe assemble.
   f. Fabricate a piping assembly from a blueprint.
   g. Fabricate a pipe hanger.

   Related Academic Topics (See Appendix A): C2, C3
   Workplace Skills (See Appendix B): WP2, WP5

July 30, 1996

Course Name: Pipe Specifications and Systems

Course Abbreviation: PPV 1432

Classification: Vocational-Technical Core (Pipefitting)

Description: This course is designed to provide students with information about the different metals used in making pipe; their sizes, weights, and strengths; and how they are manufactured. The pipe systems on ships and industrial plants are studied in addition to the cleanliness and testing of systems. (2 sch: 1 hr. lecture, 2 hr. lab)

Prerequisites: None

Competencies and Suggested Objectives:

1. Demonstrate the ability to identify various metals used in the piping industry.
   a. Identify and explain the use of ferrous metals.
   b. Identify and explain the use of non-ferrous metals.
   c. Identify and explain the piping material required for different job specifications.

   Related Academic Topics (See Appendix A): C1, C2, C3, C5, C6
   Workplace Skills (See Appendix B): WP2, WP5
2. Demonstrate the ability to safely connect various types of metals (pipes).
   a. Connect various types of ferrous metals.
   b. Connect various types of non-ferrous metals.

   Related Academic Topics (See Appendix A): C2, C3, C5, C6, M2
   Workplace Skills (See Appendix B): WP2, WP5, WP6
3. Demonstrate the ability to safely perform operational tests on various types of pipe systems.
   a. Perform an air pressure test on various types of pipe systems.
   b. Perform a hydrostatic test on various types of pipe systems.

   Related Academic Topics (See Appendix A): C2, C3, C5, C6, M4
   Workplace Skills (See Appendix B): WP2, WP5, WP6

Course Name: Rigging and Signaling

Course Abbreviation: PPV 1812

Classification: Vocational-Technical Core (Pipefitting), Vocational-Technical Elective (Plumbing)

Description: This course is designed to provide the student with basic use of hand signals, rigging, and equipment. (2 sch: 1 hr. lecture, 2 hr. lab)

Prerequisites: None

Competencies and Suggested Objectives:

1. Demonstrate the ability to safely use the techniques of signals, riggings, and lifting.
   a. Identify, explain, and safely use a chain hoist.
   b. Identify, explain, and safely use a come-a-long.
   c. Explain and safely use ropes.
   d. Explain and safely use different types of chains.
   e. Identify, explain, and select the lifting equipment for a specific task.
   f. Explain and use accepted signaling techniques.
   g. Prepare and safely use the correct types of slings, riggings, and signals for specific tasks.

   Related Academic Topics (See Appendix A): C2, C3
   Workplace Skills (See Appendix B): WP2, WP5, WP6

Course Name: Advanced Pipefitting Lab

Course Abbreviation: PPV 1456

Classification: Vocational-Technical Core (Pipefitting)

Description: This course is designed to provide information in the areas of advanced pipefitting layout and fabrication of piping systems. (6 sch: 2 hr. lecture, 8 hr. lab)

Prerequisites: None

Competencies and Suggested Objectives:

1. Demonstrate the ability to design and safely lay out various piping systems.
   a. Define terms used in the design and layout of a piping system.
   b. Explain the steps in designing and laying out a piping system.
   c. Design a piping system to scale.
   d. Lay out the designed system.

   Related Academic Topics (See Appendix A): C2, C3, C5, C6, M2, M4
   Workplace Skills (See Appendix B): WP2, WP5, WP6
2. Demonstrate the ability to safely fabricate various piping systems using compression and full way types of valves.
   a. Fabricate a water distribution system including the service, distribution, fixture branches, and fixture supplies.
   b. Fabricate a hot water system to include the distribution pipes, fixture branches, fixture supplies, and the installation of a water heater.
   c. Fabricate a butt weld piping system to include horizontal and vertical flanges, offsets, saddles, and laterals.

   Related Academic Topics (See Appendix A): C1, C2, C3, C5, C6, M2, M4
   Workplace Skills (See Appendix B): WP2, WP5, WP6

Course Name: Steel Ship Building and Marine Construction

Course Abbreviation: PPV 1823

Classification: Vocational-Technical Elective (Pipefitting)

Description: This course is designed to provide students with information about the structure of a ship and allows them to become familiar with the abbreviation of parts and sections of ships. Instruction is provided in various types of piping systems, including both building and marine pipefitting systems. (3 sch: 2 hr. lecture, 2 hr. lab)

Prerequisites: None

Competencies and Suggested Objectives:

1. Demonstrate the ability to identify various parts of a ship on a drawing.
   a. Label and define the following parts of a ship:
      (1) Different decks
      (2) Forward - aft
      (3) Port - starboard
      (4) Beam
      (5) Frames
      (6) Sections
      (7) Engine room
      (8) Bulkheads
      (9) Center line
      (10) Ship holes and compartments
      (11) Inner bottoms

   Related Academic Topics (See Appendix A): C1, C2, C3
   Workplace Skills (See Appendix B): WP2, WP5
2. Demonstrate the ability to identify and explain the purposes of the various lines on a ship.
   a. Identify and explain the use of various codings of lines.
   b. Identify and explain the main steam line.
   c. Identify and explain the auxiliary steam line.
   d. Identify and explain the air condition/refrigeration lines.
   e. Identify and explain the drain lines.
   f. Identify and explain the fuel oil lines.
   g. Identify and explain the lube oil lines.
   h. Identify and explain the fuel transfer lines.
   I. Identify and explain the hydraulic lines.

j. Identify and explain the compressed air lines.

Related Academic Topics (See Appendix A): C2, C3
Workplace Skills (See Appendix B): WP2, WP5, WP6

3. Demonstrate the ability to identify and explain the purposes of the various systems on a ship.
   a. Identify and explain the venting systems.
   b. Identify and explain the fire main system.
   c. Identify and explain the potable water systems.
   d. Identify and explain the coding systems used for various ship systems.

Related Academic Topics (See Appendix A): C2, C3, C5, C6
Workplace Skills (See Appendix B): WP2, WP5, WP6

Course Name: Special Project in Pipefitting

Course Abbreviation: PPV 291(1-3)

Classification: Vocational-Technical Elective (Pipefitting)

Description: This course is designed to provide the student with practical application of skills and knowledge gained in other technical courses. The instructor works closely with the student to insure that the selection of a project will enhance the student's learning experience. (1-3 sch: 2-6 hr. lab)

Prerequisites: Consent of Instructor

Competencies and Suggested Objectives:

1. Develop a written plan which details the activities and projects to be completed.
   a. Utilize a written plan which details the activities and projects to be completed.
   b. Perform written occupational objectives in the special project.
   Related Academic Topics (See Appendix A): C5, C6
   Workplace Skills (See Appendix B): WP1, WP6
2. Assess accomplishment of objectives.
   a. Prepare daily written assessment of accomplishment of objectives.
   b. Present weekly written reports to instructor in activities performed and objectives accomplished.
   Related Academic Topics (See Appendix A): C5, C6
   Workplace Skills (See Appendix B): WP6
3. Utilize and follow a set of written guidelines for the special project.
   a. Develop and follow a set of written guidelines for the special project.
   Related Academic Topics (See Appendix A): C5, C6
   Workplace Skills (See Appendix B): WP1, WP6

Course Name: Work-Based Learning in Pipefitting

Course Abbreviation: PPV 292(1-6)

Classification: Vocational-Technical Elective (Pipefitting)

Description: This course is a cooperative program between industry and education and is designed to integrate the student's studies with industrial experience. Variable credit is awarded on the basis of semester hour per 45 industrial contact hours. (1-6 sch: 3-18 hr. externship)

Prerequisites: Consent of instructor

Competencies and Suggested Objectives:

1. Apply technical skills needed to be a viable member of the work force.
   a. Prepare a description of technical skills to be developed.
   b. Develop technical skills needed to be a viable member of the work force.
   Related Academic Topics (See Appendix A): C4, C5
   Workplace Skills (See Appendix B): WP1
2. Apply skills developed in other program area courses.
   a. Perform skills developed in other program area courses.
   Related Academic Topics (See Appendix A): C4, C5
   Workplace Skills (See Appendix B): WP6
3. Apply human relationship skills.
   a. Practice human relationship skills in the program.
   Related Academic Topics (See Appendix A): C6
   Workplace Skills (See Appendix B): WP3
4. Apply and practice positive work habits and responsibilities.
   a. Perform assignments to develop positive work habits and responsibilities.
   Related Academic Topics (See Appendix A): C5, C6
   Workplace Skills (See Appendix B): WP3
5. Work with instructor and employer to develop written occupational objectives to be accomplished.
   a. Perform written occupational objectives.
   Related Academic Topics (See Appendix A): C5
   Workplace Skills (See Appendix B): WP6
6. Assess accomplishment of objectives.
   a. Prepare daily written assessment of accomplishment of objectives.
   b. Present weekly written reports to instructor in activities performed and objectives accomplished.
   Related Academic Topics (See Appendix A): C5
   Workplace Skills (See Appendix B): WP6

7. Utilize a set of written guidelines.
   a. Develop and follow a set of written guidelines.
   Related Academic Topics (See Appendix A): C5
   Workplace Skills (See Appendix B): WP6

PLUMBING COURSES

Course Name: Gas Piping

Course Abbreviation: PPV 1622

Classification: Vocational-Technical Core (Plumbing)

Description: This course is designed to provide students with information on standard gas codes. The safe installation of gas appliances and gas lines, according to codes, will be included. (2 sch: 1 hr. lecture, 2 hr. lab)

Prerequisites: None

Competencies and Suggested Objectives:

1. Demonstrate the ability to identify and safely apply all codes pertaining to gas and plumbing installation.
   a. Identify local authority for gas installation.
   b. Identify Southern Gas Code definitions.
   c. Identify installation requirements for undiluted liquefied petroleum gas.
   d. Explain and utilize Standard Gas Code for installation requirements for residences and apartments.
   e. Explain and utilize Standard Gas Code for installation requirements for specific appliances.
   f. Identify general regulations.
   g. Use reference index in Standard Gas Code.

   Related Academic Topics (See Appendix A): C1, C2, C3, C5, C6
   Workplace Skills (See Appendix B): WP2, WP5, WP6
2. Demonstrate the ability to identify approved appliances and materials for gas and plumbing installations.
   a. Identify approved gas appliances.
   b. Identify approved materials.
   c. Identify approved joints and connections.
   d. Identify approved methods of hanging and supporting.
   e. Apply approved methods for safely testing lines using a mercury gauge.

   Related Academic Topics (See Appendix A): C1, C2, C3, C5, C6, M2
   Workplace Skills (See Appendix B): WP2, WP5, WP6
3. Demonstrate the ability to apply the principles of the British Thermal Unit (B.T.U.).
   a. Explain the B.T.U. principles.
   b. Size and install a gas piping system per given B.T.U. requirements.

   Related Academic Topics (See Appendix A): C1, C2, C3, C5, C6, M2
   Workplace Skills (See Appendix B): WP2, WP5, WP6

Course Name: Drainage and Sewer Systems

Course Abbreviation: PPV 1513

Classification: Vocational-Technical Core (Plumbing), Vocational-Technical Elective (Pipefitting)

Description: This course is designed to provide information and practical aspects of drainage and disposal systems and the Southern Standard Plumbing Code. Included are the installation of the drainage system in a residential unit covering health aspects and the disposal of poisonous gases arising from the discharge of traps. Also included is a history of plumbing and sewage treatment. Instruction is provided on elements of disposal systems, including sewer, septic tanks, tank size calculations, maintenance causes, and removal of sewer obstructions. (3 sch: 1 hr. lecture, 4 hr. lab)

Prerequisites: None

Competencies and Suggested Objectives:

1. Demonstrate the ability to identify and explain safety in drainage and sewer systems.
   a. Identify and explain health department regulations for drainage and sewer systems.
   b. Identify and explain hazards of working in confined spaces in presence of methane gas.
   c. Identify standard plumbing code definitions.
   d. Identify local authority for plumbing installation.
   e. Identify approved traps and cleanouts.

   Related Academic Topics (See Appendix A): C2, C3, C5, C6
   Workplace Skills (See Appendix B): WP2, WP5, WP6
2. Identify various systems used in drainage and sewer systems.
   a. Identify various types of vents.
   b. Identify various types of drains, including storm.
   c. Explain safety procedures.

   Related Academic Topics (See Appendix A): C2, C3, C5, C6
   Workplace Skills (See Appendix B): WP2, WP5, WP6
3. Safely install various types of waste pipes.
   a. Install different types of traps.
   b. Install stacks according to functions.
   c. Install soil pipes.
   d. Install waste pipes.

   Related Academic Topics (See Appendix A): C2, C3, C5, C6, M2
   Workplace Skills (See Appendix B): WP2, WP3, WP5, WP6

4. Demonstrate the ability to identify various types of sewers.
   a. Differentiate between combined sewers.
   b. Identify sanitary sewers.
   c. Identify storm sewers.
   d. Estimate the drainage fixture unit (D.F.U.)

   Related Academic Topics (See Appendix A): C2, C3, C5, C6, M2
   Workplace Skills (See Appendix B): WP2, WP5, WP6
5. Demonstrate the ability to describe various functions of sewage treatment.
   a. Describe the functions of a septic tank.
   b. Describe the functions of a grease trap.
   c. Describe the operation of a sewage treatment plant.
   d. Identify and describe the functions of aquatic-vegetation in the treatment of sewage.
   e. Explain safety aspects of sewage treatment.

   Related Academic Topics (See Appendix A): C2, C3, C5, C6
   Workplace Skills (See Appendix B): WP2, WP5, WP6
6. Demonstrate the ability to lay out and safely clean a sewage system.
   a. Design and lay out a basic sewage system
   b. Safely operate a sewer machine to remove obstructions.

   Related Academic Topics (See Appendix A): C2, C3, C5, C6, M2, M4
   Workplace Skills (See Appendix B): WP2, WP4, WP5, WP6

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Course Name: Plumbing Fixtures Lab

Course Abbreviation: PPV 1722

Classification: Vocational-Technical Core (Plumbing), Vocational-Technical Elective (Pipefitting)

Description: This course is designed to provide information on the installation of the rough-in and finish fixtures used in the plumbing construction according to Southern Standard Plumbing Code. (2 sch: 4 hr. lab)

Prerequisites: None

Competencies and Suggested Objectives:

1. Demonstrate the ability to safely install various fixtures according to local, state, and/or national codes.
   a. Install a tub.
   b. Install a bidet.
   c. Install a water closet.
   d. Install a lavatory.
   e. Install a sink.
   f. Install drinking fountains.
   g. Install washer boxes.
   h. Install urinals.
   i. Install service sinks.
   j. Install mop sinks.
   k. Install a water filtering system.
   l. Identify approved plumbing fixtures.

   Related Academic Topics (See Appendix A): C2, C3, C5, C6, M2
   Workplace Skills (See Appendix B): WP2, WP5, WP6

Course Name: Back Flow Cross Connection

Course Abbreviation: PPV 1732

Classification: Vocational-Technical Core (Plumbing)

Description: This course is designed to provide the students with information on the different types of back flow devices, and the installation and testing of the devices. (2 sch: 1 hr. lecture, 2 hr. lab)

Prerequisites: None

Competencies and Suggested Objectives:

1. Demonstrate the ability to identify and explain various aspects of back flow requirements.
   a. Define and explain the purpose and scope of back flow requirements.
   b. Define and explain the responsibility, liability, and authority for back flow preventions.
   c. Identify devices used to prevent back flow.

   Related Academic Topics (See Appendix A): C2, C3, C5, C6
   Workplace Skills (See Appendix B): WP2, WP5, WP6
2. Demonstrate the ability to discuss lay out and tests on back flow devices.
   a. Discuss the principles of pressure as it applies to plumbing.
   b. Discuss back flow devices.
   c. Discuss a record keeping system.

   Related Academic Topics (See Appendix A): C2, C3, C5, C6
   Workplace Skills (See Appendix B): WP2, WP5, WP6

Course Name: Advanced Plumbing Lab

Course Abbreviation: PPV 1743

Classification: Vocational-Technical Core (Plumbing)

Description: This course is designed to provide additional study the area of advanced plumbing in the commercial area. (3 sch: 1 hr. lecture, 4 hr. lab)

Prerequisites: None

Competencies and Suggested Objectives:

1. Demonstrate the ability to safely install various commercial components and fixtures in accordance with required codes.
   a. Install commercial hangers and supports.
   b. Install sump pumps.
   c. Install sewage ejector.
   d. Install knee-action mixing valves.
   e. Install commercial plumbing fixtures.
   f. Install acid waste lines.
   g. Install wall carriers.

   Related Academic Topics (See Appendix A): C2, C3, C5, C6, M2, M4
   Workplace Skills (See Appendix B): WP2, WP4, WP5, WP6

Course Name: Heating Devices

Course Abbreviation: PPV 1612

Classification: Vocational-Technical Core (Plumbing)

Description: This course is designed to provide information to students in the area of local codes for installing water heaters, panel ray heaters, force air units, and floor furnaces. (2 sch: 1 hr. lecture, 2 hr. lab)

Prerequisites: None

Competencies and Suggested Objectives:

1. Demonstrate the ability to safely install and maintain a hot water system.
   a. Identify and explain safety procedures.
   b. Identify and explain parts of a water heater.
   c. Identify and describe temperature and pressure (T&P) valves.
   d. Install a water heater, including T&G valves.
   e. Replace a dip tube.
   f. Construct a venting system for a water heater.
   g. Perform repairs on a water heater.
   h. Replace parts on a water heater.

   Related Academic Topics (See Appendix A): C2, C3, C5, C6, M2
   Workplace Skills (See Appendix B): WP2, WP5, WP6
2. Demonstrate the ability to safely install and maintain various heating systems.
   a. Identify and discuss the safety techniques of installing and maintaining heating systems.
   b. Install and maintain a panel ray heater.
   c. Construct a venting system for a panel ray heater.
   d. Perform repairs on a floor furnace.
   e. Determine if the venting system of a floor furnace is adequate.
   f. Troubleshoot and repair a force air heating system.
   g. Determine if the venting system for a force air heating system is adequate.
   h. Identify proper methods of venting appliances.
   I. Identify proper types of gas controls.
   j. Connect appliances to specifications.
   k. Adjust or replace ignition devices on gas appliances.

   Related Academic Topics (See Appendix A): C2, C3, C5, C6, M2
   Workplace Skills (See Appendix B): WP2, WP5, WP6
3. Explain and discuss various types of forced heat systems.
   a. Explain and discuss various types of hot water circulation systems.

b. Explain and discuss the operational procedures of a forced air heating system.
c. Discuss and explain energy reclamation for different types of heating devices.

Related Academic Topics (See Appendix A): C2, C3, C5, C6, M2
Workplace Skills (See Appendix B): WP2, WP5, WP6

Course Name: Domestic Systems

Course Abbreviation: PPV 1712

Classification: Vocational-Technical Core (Plumbing), Vocational-Technical Elective (Pipefitting)

Description: This course is designed to provide the student with information on the installation of a hot water system according to the unit fixture system. It also provides information on sizing and installation of a potable cold water system. (2 sch: 4 hr. lab)

Prerequisites: None

Competencies and Suggested Objectives:

1. Demonstrate the ability to estimate, identify, and safely maintain a hot water system.
   a. Estimate hot water supply fixture unit (H.W.S.F.U.).
   b. Estimate size of hot water heater.
   c. Estimate size of hot water storage tank.
   d. Install a force circulating hot water system.
   e. Install a natural circulating hot water system.

   Related Academic Topics (See Appendix A): C2, C3, C5, C6, M2
   Workplace Skills (See Appendix B): WP2, WP5, WP6
2. Demonstrate the ability to identify and safely install a potable cold water system.
   a. Identify potable water.
   b. Identify water mains.
   c. Identify and install water treatment system.
   d. Identify water service.
   e. Identify fixture branches.
   f. Identify fixture supplies.
   g. Identify and install water meters.
   h. Sweat copper piping.
   i. Install water service.
   j. Install a distribution system.
   k. Install fixture branches.
   l. Install fixture supplies.
   m. Identify and describe appropriate backflow devices.
   n. Identify and install a water hammer arrester.
   o. Install a pressure reducing valve and bypass.

   Related Academic Topics (See Appendix A): C2, C3, C5, C6, M2
   Workplace Skills (See Appendix B): WP2, WP5, WP6

3. Demonstrate the ability to identify and safely lay out a fire fighting system.
   a. Identify a fire fighting system.
   b. Lay out stand pipes.
   c. Identify and explain the parts of a sprinkling system.

   Related Academic Topics (See Appendix A): C2, C3, C5, C6, M2
   Workplace Skills (See Appendix B): WP2, WP5, WP6

Course Name: Piping Level/Transit

Course Abbreviation: PPV 1443

Classification: Vocational-Technical Core (Plumbing)

Description: This course is designed to give the student practical application of the leveling instruments, shooting elevations, and grading pipes. (3 sch: 1 hr. lecture, 4 hr. lab)

Prerequisites: None

Competencies and Suggested Objectives:

1. Demonstrate the use of levels and transits.
   a. Identify and explain the basic equipment.
   b. Set up the equipment, shoot elevations, and grade pipe.
   Related Academic Topics (See Appendix A): C2, C3, C5, C6, M2, M6
   Workplace Skills (See Appendix B): WP2, WP5, WP6
2. Demonstrate the ability to measure and record various measurements.
   a. Describe the use of the benchmark.
   b. Turn horizontal angles.
   c. Calculate the grade and percent of grade.
   d. Demonstrate differences in elevation between random points.
   e. Using a trencher, excavate, grade, and install a soil pipe.
   Related Academic Topics (See Appendix A): C2, C3, C5, C6, M2, M4
   Workplace Skills (See Appendix B): WP2, WP5, WP6

Course Name: Special Project in Plumbing

Course Abbreviation: PPV 191(1-3)

Classification: Vocational-Technical Elective (Plumbing)

Description: This course is designed to provide the student with practical application of skills and knowledge gained in other technical courses. The instructor works closely with the student to insure that the selection of a project will enhance the student's learning experience. (1-3 sch: 2-6 hr. lab)

Prerequisites: Consent of Instructor

Competencies and Suggested Objectives:

1. Develop a written plan which details the activities and projects to be completed.
   a. Utilize a written plan which details the activities and projects to be completed.
   b. Perform written occupational objectives in the special project.
   Related Academic Topics (See Appendix A): C5, C6
   Workplace Skills (See Appendix B): WP1, WP6
2. Assess accomplishment of objectives.
   a. Prepare daily written assessment of accomplishment of objectives.
   b. Present weekly written reports to instructor in activities performed and objectives accomplished.
   Related Academic Topics (See Appendix A): C5, C6
   Workplace Skills (See Appendix B): WP6
3. Utilize and follow a set of written guidelines for the special project.
   a. Develop and follow a set of written guidelines for the special project.
   Related Academic Topics (See Appendix A): C5, C6
   Workplace Skills (See Appendix B): WP1, WP6

Course Name: Work-Based Learning in Plumbing

Course Abbreviation: PPV 192(1-6)

Classification: Vocational-Technical Elective (Plumbing)

Description: This course is a cooperative program between industry and education and is designed to integrate the student's studies with industrial experience. Variable credit is awarded on the basis of semester hour per 45 industrial contact hours. (1-6 sch: 3-18 hr. externship)

Prerequisites: Consent of instructor

Competencies and Suggested Objectives:

1. Apply technical skills needed to be a viable member of the work force.
   a. Prepare a description of technical skills to be developed.
   b. Develop technical skills needed to be a viable member of the work force.
   Related Academic Topics (See Appendix A): C4, C5
   Workplace Skills (See Appendix B): WP1
2. Apply skills developed in other program area courses.
   a. Perform skills developed in other program area courses.
   Related Academic Topics (See Appendix A): C4, C5
   Workplace Skills (See Appendix B): WP6
3. Apply human relationship skills.
   a. Practice human relationship skills in the program.
   Related Academic Topics (See Appendix A): C6
   Workplace Skills (See Appendix B): WP3
4. Apply and practice positive work habits and responsibilities.
   a. Perform assignments to develop positive work habits and responsibilities.
   Related Academic Topics (See Appendix A): C5, C6
   Workplace Skills (See Appendix B): WP3
5. Work with instructor and employer to develop written occupational objectives to be accomplished.
   a. Perform written occupational objectives.
   Related Academic Topics (See Appendix A): C5
   Workplace Skills (See Appendix B): WP6
6. Assess accomplishment of objectives.
   a. Prepare daily written assessment of accomplishment of objectives.
   b. Present weekly written reports to instructor in activities performed and objectives accomplished.
   Related Academic Topics (See Appendix A): C5
   Workplace Skills (See Appendix B): WP6

7. Utilize a set of written guidelines.
   a. Develop and follow a set of written guidelines.
   Related Academic Topics (See Appendix A): C5
   Workplace Skills (See Appendix B): WP6

SECTION III:

RECOMMENDED TOOLS AND EQUIPMENT

RECOMMENDED TOOLS AND EQUIPMENT FOR PIPEFITTING

1. Student tool box containing:
   Pipe wrenches - 8", 10", 12", 14", 18", 24" and 36" (1 each)
   Box end wrenches 1/16" sizes: ⅛" through 1¼" (2 sets)
   Adjustable wrenches - 6", 8", 10", 12", and 15" (1 each)
   Spud (monkey) wrench set 1/32" through ½" (2 each)
2. Bending machine (1)
3. Air operated grinder (2)
4. Angle air grinder (2)
5. Angle grinder with 35' hose (3)
6. Offset grinder (3)
7. Pedestal grinder (2)
8. Pedestal grinder, 3 ph - ½ hp (2)
9. 1-ton chain hoist (2)
10. Machine pipe threading, ½ hp (2)
11. 17" drill press (1)
12. Cut off saw, 10 hp (1)
13. Metal hand saw (1)
14. Vertical band saw (1)
15. 14" circular saw (1)
16. Fabrication tables (10)
17. Hydrostatic tester (1)
18. Tool set, 14 pc., precision layout and contour (1)
19. AC/DC welder (4)
20. Welding, cutting, brazing outfit (4)
21. Air wire brushes (2)
22. Pneumatic wire brush (1)
23. Dies with segments 2½" - 4", rigid (2)
24. Vise - ⅛"-2" (10)
25. Welding cutting units (2)
26. Portable saw (1)
27. Reciprocating saw (2)
28. Flat screwdrivers, 6 per set (1 set)
29. Phillips screwdrivers, 6 per set (1 set)
30. Basin wrench (2 each)
31. Ball peen hammers – 8 oz., 10 oz., 12 oz., 20 oz. (2 sets)
32. Double flare – tubing flaring set (1)
33. Single flare – tubing flaring set (2)
34. Hand tubing benders – ⅛", ¼", ⅜", ½" (1)
35. Wrap-o-round (pipe) (6)
36. Framing square (pipefitters) (6)
37. Combination square (6)

38. 6 ft. folding rules (10)
39. 12 ft. measuring tapes (2)
40. 25 ft. measuring tapes (2)
41. 24 in. nylon strap wrench (1)
42. 18 in. chain wrench (1)
43. ½" offset drill motor, variable speed (1)
44. ½" variable speed drill motor (1)
45. ⅜" variable speed drill motor (1)
46. Welding shields (6)
47. Burning goggles (3)
48. Grinding full face shields (6)
49. 50' heavy duty extension cords (2)
50. 6 ft. folding step ladders, fiberglass (2)
51. Hole saw kit, ½" - 2½" (2)
52. Hacksaws (3)
53. 10", 12", 14" half round files (6 each)
54. PVC pipe cutters, hand held (2)
55. Locking pliers (3)
56. Torpedo levels (6)
57. 2 ft. level (1)
58. 4 ft. level (1)
59. 4" angle grinders (3)
60. ½" i.d. x 50 ft. air hose (4)
61. Propane soldering torch kit with hose and 5 gal tank (1 set)

RECOMMENDED INSTRUCTIONAL AIDS

1. Cart, AV (for overhead projector) (1)
2. Cart, AV (for TV-VCR)) (1)
3. Computer w/operating software with multimedia kit (1)
4. Printer, dot matrix (1)
5. TV-VCR (1)
6. Video out (microcomputer to TV monitor) (1)

RECOMMENDED TOOLS AND EQUIPMENT FOR PLUMBING

1. Closet auger (1)
2. Scratch awls (5)
3. Welding aprons (5)
4. Wrecking bars (2)
5. Pry bars (2)
6. Nail pullers (5)
7. Spring tube benders, assorted sets ⅜"-¾" (7)
8. ⅜" level benders (2 sets)
9. ¼" tubing benders (2 sets)
10. Circular saw blades (2)
11. Hacksaw blades (2 pk)
12. Jig saw blades – wood, metal (2 pk)
13. Reciprocating saw blades – wood, metal (2 pk)
14. Key hole saw (1)
15. Butane bottles (2)
16. R-type acetylene bottles (4)
17. Acetylene bottles (2)
18. Oxygen bottles (2)
19. Disposable mapp bottles (6)
20. Chalk line (2)
21. "C" clamps (4)
22. Cold chisels (2 sets)
23. Wood chisels (2)
24. Cylinder trucks (2)
25. Bolt cutters (2)
26. c.i. snap cutters (2)
27. Midget copper cutters (3)
28. Medium copper cutters (3)
29. Large copper cutters (3)
30. Internal cutters (2)
31. Plastic cutters (2)
32. Plastic rat cutters (1)
33. Plastic pipe crimpers (1)
34. Steel (sin wheel) cutters (4)
35. 3-wheel cutter (1)
36. ⅜" electric drill motors (2)
37. x-tra-tool drill (1)
38. Right angle drill (1)
39. Drill bit sharpener (1)
40. Metal bits (2 sets)
41. Self feeding bits (2 sets)

42. Electric drop cords (4)
43. Faucet handle puller (2)
44. Seat removers (2)
45. Flat metal files (2)
46. ¼ round files (2)
47. Three-sided files (2)
48. Wood rasp (2)
49. Flaring tools (3 sets)
50. 6 ft. folding rules (10)
51. Cabinet, safety glasses with 20 glasses (1)
52. Clear goggles (10)
53. Cutting goggles (5)
54. Welding goggles (5)
55. Cutting/welding gloves (5)
56. Power grinders (2)
57. Disc grinders (2)
58. Grinder wheels (2)
59. Claw hammers, 12 oz. (5)
60. Ball peen hammers (2)
61. Sledge hammer (1)
62. Mallet (1)
63. Hexagon key (2 sets)
64. Water hoses, 100 ft. (2)
65. Hydrostatic pump (1)
66. 6 ft. step ladder (1)
67. Torch lighters (5)
68. 24 in. carpenter levels (2)
69. Variable pitch levels (2)
70. Torpedo levels (4)
71. Line levels (2)
72. Level/transit (1)
73. Mercury gauge and air pump (1)
74. Color coded nut drivers (2 sets)
75. Oil cans, 16 oz. (5)
76. Oilers (2)
77. Open end wrench set, ½" drive (2 sets)
78. Pipe dies (3 sets)
79. 3-way dies (1 set)
80. Large rat dies (1 set)
81. Pipe reamers (2)
82. Power driver (1)
83. Power vise (2)
84. Needle nose pliers (4)
85. Slip joint pliers (10)

86. Locking pliers (10)
87. Wire cutters (4)
88. Vise grips (4)
89. Punches (2)
90. Plumb bobs (5)
91. Reciprocating saws (2)
92. Jig saws (2)
93. 7½" circular saw (1)
94. Hack saws (5)
95. Hand saws (5)
96. Key hole saws (5)
97. Cut off saw (1)
98. Snips, left hand (5)
99. Snips, right hand (5)
100. Snips, straight (5)
101. Shovel, round (4)
102. Shovel, square (4)
103. Shovel, sharpshooter (4)
104. Swaging tools (2)
105. Face shields (2)
106. Welding shields (2)
107 Socket set, ½" drive (2 sets)
108. Assorted flat blades, screwdrivers (1 set)
109. Assorted Phillips head, screwdrivers (1 set)
110. Angle squares (5)
111. Combination squares (5)
112. T" squares (5)
113. Builders string (2 rolls)
114. Sewer tape (2)
116. Sewer machine (1)
117. Torches, mapp gas (5)
118. Torches, turbo (2)
119. Torch, butane (1)
120. Prest-o-lite torch (1)
121. Torches, oxy/acetylene (2)
122. Rigid acetylene, torch (1)
123. 10 ft. tapes (5)
124. 16 ft tapes (5)
125. 25 ft. tapes (5)
126. 100 ft. tape (1)
127. Tri-stand yoke vises (2)
128. Tri-stand chain vises (2)
129. Chain bench vises (2)
130. Yoke bench vises (2)

131. Machinist vises (2)
132. Welding vises (2)
133. Portable vises (2)
134. Basin wrenches (2)
135. Adjustable wrenches: 4-6", 6-8", 6-10", 4-12", 4-15' (24)
136. Basket strainer wrenches (4)
137. Pipe wrenches: 4-6", 4-8", 4-10", 6-12", 6-14", 4-18", 4-24" (32)
138. Offset wrenches: 2-14", 2-18" (4)
139. Angle wrenches : 2-6", 2-8" (4)
140. Chain wrenches: 2-18", 2-24" (4)
141. Strap wrenches (2)
142. Torque wrenches (2)
143. Spud wrenches (2)
144. 3 to 1 spud wrenches (2)
145. Welders with cables (2)
146. Wrap-a-rounds (2)
147. Chain hoist, 1 ton (1)
148. Come-a-long, 1 ton (1)
149. Assorted chains, ropes, pulleys, slings, and chockers

RECOMMENDED INSTRUCTIONAL AIDS

1. Cart, AV (for overhead projector) (1)
2. Cart, AV (for TV-VCR) (1)
3. Computer w/operating software with multimedia kit (1)
4. Printer, dot matrix (1)
5. TV-VCR (1)
6. Video out (microcomputer to TV monitor) (1)

APPENDIX A:

RELATED ACADEMIC TOPICS

APPENDIX A

RELATED ACADEMIC TOPICS FOR COMMUNICATIONS

C1 Interpret written material.
C2 Interpret visual materials (maps, charts, graphs, tables, etc.).
C3 Listen, comprehend, and take appropriate actions.
C4 Access, organize, and evaluate information.
C5 Use written and/or oral language skills to work cooperatively to solve problems, make decisions, take actions, and reach agreement.
C6 Communicate ideas and information effectively using various oral and written forms for a variety of audiences and purposes.

EXPANDED TOPICS FOR COMMUNICATIONS

TOPIC C1: Interpret written material.

C1.01 Read and follow complex written directions.
C1.02 Recognize common words and meanings associated with a variety of occupations.
C1.03 Adjust reading strategy to purpose and type of reading.
C1.04 Use sections of books and reference sources to obtain information.
C1.05 Compare information from multiple sources and check validity.
C1.06 Interpret items and abbreviations used in multiple forms.
C1.07 Interpret short notes, memos, and letters.
C1.08 Comprehend technical words and concepts.
C1.09 Use various reading techniques depending on purpose for reading.
C1.10 Find, read, understand, and use information from printed matter or electronic sources.

TOPIC C2: Interpret visual materials (maps, charts, graphs, tables, etc.).

C2.01 Use visuals in written and in oral presentations.
C2.02 Recognize visual cues to meaning (layout, typography, etc.).
C2.03 Interpret and apply information using visual materials.

TOPIC C3: Listen, comprehend, and take appropriate action.

C3.01 Identify and evaluate orally-presented messages according to purpose.
C3.02 Recognize barriers to effective listening.
C3.03 Recognize how voice inflection changes meaning.
C3.04 Identify speaker signals requiring a response and respond accordingly.
C3.05 Listen attentively and take accurate notes.
C3.06 Use telephone to receive information.

C3.07 Analyze and distinguish information from formal and informal oral presentations.

TOPIC C4: Access, organize, and evaluate information.

C4.01 Distinguish fact from opinion.
C4.02 Use various print and non-print sources for specialized information.
C4.03 Interpret and distinguish between literal and figurative meaning.
C4.04 Interpret written or oral communication in relation to context and writer's point of view.
C4.05 Use relevant sources to gather information for written or oral communication.

TOPIC C5: Use written and/or oral language skills to work cooperatively to solve problems, make decisions, take actions, and reach agreement.

C5.01 Select appropriate words for communication needs.
C5.02 Use reading, writing, listening, and speaking skills to solve problems.
C5.03 Compose inquiries and requests.
C5.04 Write persuasive letters and memos.
C5.05 Edit written reports, letters, memos, and short notes for clarity, correct grammar, and effective sentences.
C5.06 Write logical and understandable statements, phrases, or sentences for filling out forms, for correspondence or reports.
C5.07 Write directions or summaries of processes, mechanisms, events, or concepts.
C5.08 Select and use appropriate formats for presenting reports.
C5.09 Convey information to audiences in writing.
C5.10 Compose technical reports and correspondence that meet accepted standards for written communications.

TOPIC C6: Communicate ideas and information using oral and written forms for a variety of audiences and purposes.

C6.01 Give complex oral instructions.
C6.02 Describe a business or industrial process/mechanism.
C6.03 Participate effectively in group discussions and decision making.
C6.04 Produce effective oral messages utilizing different media.
C6.05 Explore ideas orally with partners.
C6.06 Participate in conversations by volunteering information when appropriate and asking relevant questions when appropriate.
C6.07 Restate or paraphrase a conversation to confirm one's own understanding.
C6.08 Gather and provide information utilizing different media.

C6.09 Prepare and deliver persuasive, descriptive, and demonstrative oral presentations.

RELATED ACADEMIC TOPICS FOR MATHEMATICS

M1 Relate number relationships, number systems, and number theory.
M2 Explore patterns and functions.
M3 Explore algebraic concepts and processes.
M4 Explore the concepts of measurement.
M5 Explore the geometry of one-, two-, and three-dimensions.
M6 Explore concepts of statistics and probability in real world situations.
M7 Apply mathematical methods, concepts, and properties to solve a varietv of real-world problems.

EXPANDED TOPICS FOR MATHEMATICS

TOPIC M1: Relate number relationships, number systems, and number theory.

M1.01 Understand, represent, and use numbers in a variety of equivalent forms (integer, fraction, decimal, percent, exponential, and scientific notation) in real world and mathematical problem situations.
M1.02 Develop number sense for whole numbers, fractions, decimals, integers, and rational numbers.
M1.03 Understand and apply ratios, proportions, and percents in a wide variety of situations.
M1.04 Investigate relationships among fractions, decimals, and percents.
M1.05 Compute with whole numbers, fractions, decimals, integers, and rational numbers.
M1.06 Develop, analyze, and explain procedures for computation and techniques for estimations.
M1.07 Select and use an appropriate method for computing from among mental arithmetic, paper-and-pencil, calculator, and computer methods.
M1.08 Use computation, estimation, and proportions to solve problems.
M1.09 Use estimation to check the reasonableness of results.

TOPIC M2: Explore patterns and functions.

M2.01 Describe, extend, analyze, and create a wide variety of patterns.
M2.02 Describe and represent relationships with tables, graphs, and rules.
M2.03 Analyze functional relationships to explain how a change in one quantity results in a change in another.
M2.04 Use patterns and functions to represent and solve problems.
M2.05 Explore problems and describe results using graphical, numerical, physical, algebraic, and verbal mathematical models or representations.

M2.06 Use a mathematical idea to further their understanding of other mathematical ideas.
M2.07 Apply mathematical thinking and modeling to solve problems that arise in other disciplines, such as art, music, and business.

TOPIC M3: Explore algebraic concepts and processes.

M3.01 Represent situations and explore the interrelationships of number patterns with tables, graphs, verbal rules, and equations.
M3.02 Analyze tables and graphs to identify properties and relationships and to interpret expressions and equations.
M3.03 Apply algebraic methods to solve a variety of real world and mathematical problems.

TOPIC M4: Explore the concepts of measurement.

M4.01 Estimate, make, and use measurements to describe and compare phenomena.
M4.02 Select appropriate units and tools to measure to the degree of accuracy required in a particular situation.
M4.03 Extend understanding of the concepts of perimeter, area, volume, angle measure, capacity, and weight and mass.
M4.04 Understand and apply reasoning processes, with special attention to spatial reasoning and reasoning with proportions and graphs.

TOPIC M5: Explore the geometry of one-, two-, and three-dimensions.

M5.01 Identify, describe, compare, and classify geometric figures.
M5.02 Visualize and represent geometric figures with special attention to developing spatial sense.
M5.03 Explore transformations of geometric figures.
M5.04 Understand and apply geometric properties and relationships.
M5.05 Classify figures in terms of congruence and similarity and apply these relationships.

TOPIC M6: Explore the concepts of statistics and probability in real world situations.

M6.01 Systematically collect, organize, and describe data.
M6.02 Construct, read, and interpret tables, charts, and graphs.
M6.03 Develop an appreciation for statistical methods as powerful means for decision making.
M6.04 Make predictions that are based on exponential or theoretical probabilities.

M6.05 Develop an appreciation for the pervasive use of probability in the real world.

TOPIC M7: Apply mathematical methods, concepts, and properties to solve a variety of real-world problems.

M7.01 Use computers and/or calculators to process information for all mathematical situations.
M7.02 Use problem-solving approaches to investigate and understand mathematical content.
M7.03 Formulate problems from situations within and outside mathematics.
M7.04 Generalize solutions and strategies to new problem situations.

RELATED ACADEMIC TOPICS FOR SCIENCE

S1 Explain the Anatomy and Physiology of the human body.
S2 Apply the basic biological principles of Plants, Viruses and Monerans, Algae, Protista, and Fungi.
S3 Relate the nine major phyla of the kingdom animalia according to morphology, anatomy, and physiology.
S4 Explore the chemical and physical properties of the earth to include Geology, Meteorology, Oceanography, and the Hydrologic Cycle.
S5 Investigate the properties and reactions of matter to include symbols, formulas and nomenclature, chemical equations, gas laws, chemical bonding, acid-base reactions, equilibrium, oxidation-reduction, nuclear chemistry, and organic chemistry.
S6 Explore the principles and theories related to motion, mechanics, electricity, magnetism, light energy, thermal energy, wave energy, and nuclear physics.
S7 Explore the principles of genetic and molecular Biology to include the relationship between traits and patterns of inheritance, population genetics, the structure and function of DNA, and current applications of DNA technology.
S8 Apply concepts related to the scientific process and method to include safety procedures for classroom and laboratory; use and care of scientific equipment; interrelationships between science, technology and society; and effective communication of scientific results in oral, written, and graphic form.

EXPANDED TOPICS FOR SCIENCE

TOPIC S1: Explain the Anatomy and Physiology of the human body.

S1.01 Recognize common terminology and meanings.
S1.02 Explore the relationship of the cell to more complex systems within the body.

S1.03 Summarize the functional anatomy of all the major body systems.
S1.04 Relate the physiology of the major body systems to its corresponding anatomy.
S1.05 Compare and contrast disease transmission and treatment within each organ system.
S1.06 Explore the usage of medical technology as related to human organs and organ systems.
S1.07 Explain the chemical composition of body tissue.

TOPIC S2: Apply the basic biological principles of Plants, Viruses and Monerans, Algae, Protista, and Fungi.

S2.01 Identify the major types and structures of plants, viruses, monera, algae protista, and fungi.
S2.02 Explain sexual and asexual reproduction.
S2.03 Describe the ecological importance of plants as related to the environment.
S2.04 Analyze the physical chemical and behavioral process of a plant.

TOPIC S3: Relate the nine major phyla of the kingdom animalia according to morphology, anatomy, and physiology.

S3.01 Explain the morphology, anatomy, and physiology of animals.
S3.02 Describe the characteristics, behaviors, and habitats of selected animals.

TOPIC S4: Explore the chemical and physical properties of the earth to include Geology, Meteorology, Oceanography, and the Hydrologic Cycle.

S4.01 Examine minerals and their identification, products of the rock cycle, byproducts of weathering, and the effects of erosion.
S4.02 Relate the Hydrologic Cycle to include groundwater its zones, movement, and composition; surface water systems, deposits, and runoff.
S4.03 Consider the effects of weather and climate on the environment.
S4.04 Examine the composition of seawater; wave, tides, and currents; organisms, environment, and production of food; energy, food and mineral resources of the oceans.

TOPIC S5: Investigate the properties and reactions of matter to include symbols, formulas and nomenclature, chemical equations, gas laws, chemical bonding, acid-base reactions, equilibrium, oxidation-reduction, nuclear chemistry, and organic chemistry.

S5.01 Examine the science of chemistry to include the nature of matter, symbols, formulas and nomenclature, and chemical equations.

S5.02 Identify chemical reactions including precipitation, acids-bases, and reduction-oxidation.
S5.03 Explore the fundamentals of chemical bonding and principles of equilibrium.
S5.04 Relate the behavior of gases.
S5.05 Investigate the structure, reactions, and uses of organic compounds; and investigate nuclear chemistry and radiochemistry.

TOPIC S6: Explore the principles and theories related to motion, mechanics, electricity, magnetism, light energy, thermal energy, wave energy, and nuclear physics.

S6.01 Examine fundamentals of motion of physical bodies and physical dynamics.
S6.02 Explore the concepts and relationships among work, power, and energy.
S6.03 Explore principles, characteristics, and properties of electricity, magnetism, light energy, thermal energy, and wave energy.
S6.04 Identify principles of modern physics related to nuclear physics.

TOPIC S7: Explore the principles of genetic and molecular Biology to include the relationship between traits and patterns of inheritance; population genetics, the structure and function of DNA, and current applications of DNA technology.

S7.01 Examine principles, techniques, and patterns of traits and inheritance in organisms.
S7.02 Apply the concept of population genetics to both microbial and multicellular organism.
S7.03 Identify the structure and function of DNA and the uses of DNA technology in science, industry, and society.

TOPIC S8: Apply concepts related to the scientific process and method to include safety procedures for classroom and laboratory; use and care of scientific equipment; interrelationships between science, technology and society; and effective communication of scientific results in oral, written, and graphic form.

S8.01 Apply the components of scientific processes and methods in classroom and laboratory investigations.
S8.02 Observe and practice safe procedures in the classroom and laboratory.
S8.03 Demonstrate proper use and care for scientific equipment.
S8.04 Investigate science careers, and advances in technology.
S8.05 Communicate results of scientific investigations in oral, written, and graphic form.

APPENDIX B:

WORKPLACE SKILLS

APPENDIX B
WORKPLACE SKILLS FOR THE 21ST CENTURY

WP1 Allocates resources (time, money, materials and facilities, and human resources).

WP2 Acquires, evaluates, organizes and maintains, and interprets/communicates information, including the use of computers.

WP3 Practices interpersonal skills related to careers including team member participation, teaching other people, serving clients/customers, exercising leadership, negotiation, and working with culturally diverse.

WP4 Applies systems concept including basic understanding, monitoring and correction system performance, and designing and improving systems.

WP5 Selects, applies, and maintains/troubleshoots technology.

WP6 Employs thinking skills including creative thinking, decision making, problem solving, reasoning, and knowing how to learn.

APPENDIX C:

STUDENT COMPETENCY PROFILE

STUDENT COMPETENCY PROFILE
FOR PIPEFITTING

Student: _____

This record is intended to serve as a method of noting student achievement of the competencies in each course. It can be duplicated for each student and serve as a cumulative record of competencies achieved in the program.

In the blank before each competency, place the date on which the student mastered the competency.

Fundamentals of Plumbing/Pipefitting (PPV 1113)

_____ 1. Describe personal safety rules for working in the plumbing/pipefitting industry.
_____ 2. Demonstrate the ability to identify and discuss the basic fittings used in the industry.
_____ 3. Demonstrate the ability to identify and safely use the basic tools and equipment.

Tacking, Brazing, and Burning (PPV 1213)

_____ 1. Demonstrate the ability to safely set up and use the electric arc machine and the oxyacetylene torch.
_____ 2. Demonstrate the ability to safely cut various shapes on steel and pipe.
_____ 3. Demonstrate the ability to safely tack weld plate with the use of various rods and positions.
_____ 4. Demonstrate the ability to safely tack weld pipes in different positions.
_____ 5. Demonstrate the ability to safely prepare, solder, braze, and test various joints.

Blueprint Reading for Piping Trades (PPV 1313)

_____ 1. Demonstrate the ability to identify the symbols, notes, and terms used in sketching and on piping and structural drawings.
_____ 2. Demonstrate the ability to interpret piping and structural blueprints.

Sketching (PPV 1323)

_____1. Demonstrate the ability to sketch piping objects.
_____2. Demonstrate the ability to read different scales used on piping drawings.
_____3. Demonstrate the ability to do freehand lettering.
_____4. Demonstrate the ability to sketch piping drawings.

Low Pressure Boilers (PPV 1411)

_____1. Demonstrate the ability to identify and explain boiler fittings and accessories, including thermo expansion devices.
_____2. Demonstrate the ability to identify and explain the operations of a boiler.

Basic Pipe Fabrication (PPV 1423)

_____ 1. Develop the ability to identify and safely use pipefitting tools and equipment.
_____ 2. Demonstrate the ability to safely fabricate various pipe assemblies.

Pipe Specifications and Systems (PPV 1432)

_____ 1. Demonstrate the ability to identify various metals used in the piping industry.
_____ 2. Demonstrate the ability to safely connect various types of metals (pipes).
_____ 3. Demonstrate the ability to safely perform operational tests on various types of pipe systems.

Rigging and Signaling (PPV 1812)

_____ 1. Demonstrate the ability to safely use the techniques of signals, riggings, and lifting.

Advanced Pipefitting Lab (PPV 1456)

_____ 1. Demonstrate the ability to design and safely lay out various piping systems.
_____ 2. Demonstrate the ability to safely fabricate various piping systems using compression and full way types of valves.

Steel Ship Building and Marine Construction (PPV 1823)

_____ 1. Demonstrate the ability to identify various parts of a ship on a drawing.
_____ 2. Demonstrate the ability to identify and explain the purposes of the various lines on a ship.
_____ 3. Demonstrate the ability to identify and explain the purposes of the various systems on a ship.

Special Project in Pipefitting (PPV 291(1-3))

_____ 1. Develop a written plan which details the activities and projects to be completed.
_____ 2. Assess accomplishment of objectives.
_____ 3. Utilize and follow a set of written guidelines for the special project.

Work-Based Learning in Pipefitting (PPV 292(1-6))

_____ 1. Apply technical skills needed to be a viable member of the work force.
_____ 2. Apply skills developed in other program area courses.
_____ 3. Apply human relationship skills.
_____ 4. Apply and practice positive work habits and responsibilities.
_____ 5. Work with instructor and employer to develop written occupational objectives to be accomplished.
_____ 6. Assess accomplishment of objectives.
_____ 7. Utilize a set of written guidelines.

Domestic Systems (PPV 1712)

_____ 1. Demonstrate the ability to estimate, identify, and safely maintain a hot water system.
_____ 2. Demonstrate the ability to identify and safely install a potable cold water system.
_____ 3. Demonstrate the ability to identify and safely lay out a fire fighting system.

Drainage and Sewer Systems (PPV 1513)

_____ 1. Demonstrate the ability to identify and explain safety in drainage and sewer systems.
_____ 2. Identify various systems used in drainage and sewer systems.
_____ 3. Safely install various types of waste pipes.

_____ 4. Demonstrate the ability to identify various types of sewers.
_____ 5. Demonstrate the ability to describe various functions of sewage treatment.
_____ 6. Demonstrate the ability to lay out and safely clean a sewage system.

Plumbing Fixtures Lab (PPV 1722)

_____ 1. Demonstrate the ability to safely install various fixtures according to local, state, and/or national codes.

STUDENT COMPETENCY PROFILE FOR PLUMBING

Student: _____

This record is intended to serve as a method of noting student achievement of the competencies in each course. It can be duplicated for each student and serve as a cumulative record of competencies achieved in the program.

In the blank before each competency, place the date on which the student mastered the competency.

Fundamentals of Plumbing/Pipefitting (PPV 1113)

_____ 1. Describe personal safety rules for working in the plumbing/pipefitting industry.
_____ 2. Demonstrate the ability to identify and discuss the basic fittings used in the industry.
_____ 3. Demonstrate the ability to identify and safely use the basic tools and equipment.

Drainage and Sewer Systems (PPV 1513)

_____ 1. Demonstrate the ability to identify and explain safety in drainage and sewer systems.
_____ 2. Identify various systems used in drainage and sewer systems.
_____ 3. Safely install various types of waste pipes.
_____ 4. Demonstrate the ability to identify various types of sewers.
_____ 5. Demonstrate the ability to describe various functions of sewage treatment.
_____ 6. Demonstrate the ability to lay out and safely clean a sewage system.

Plumbing Fixtures Lab (PPV 1722)

_____ 1. Demonstrate the ability to safely install various fixtures according to local, state, and/or national codes.

Back Flow Cross Connection (PPV 1732)

_____ 1. Demonstrate the ability to identify and explain various aspects of back flow requirements.
_____ 2. Demonstrate the ability to discuss lay out and tests on back flow devices.

Gas Piping (PPV 1622)

_____ 1. Demonstrate the ability to identify and safely apply all codes pertaining to gas and plumbing installation.
_____ 2. Demonstrate the ability to identify approved appliances and materials for gas and plumbing installations.
_____ 3. Demonstrate the ability to apply the principles of the British Thermal Unit (B.T.U.).

Heating Devices (PPV 1612)

_____ 1. Demonstrate the ability to safely install and maintain a hot water system.
_____ 2. Demonstrate the ability to safely install and maintain various heating systems.
_____ 3. Explain and discuss various types of forced heat systems.

Domestic Systems (PPV 1712)

_____ 1. Demonstrate the ability to estimate, identify, and safely maintain a hot water system.
_____ 2. Demonstrate the ability to identify and safely install a potable cold water system.
_____ 3. Demonstrate the ability to identify and safely lay out a fire fighting system.

Low Pressure Boilers (PPV 1411)

_____1. Demonstrate the ability to identify and explain boiler fittings and accessories, including thermo expansion devices.
_____2. Demonstrate the ability to identify and explain the operations of a boiler.

Blueprint Reading for Piping Trades (PPV 1313)

_____ 1. Demonstrate the ability to identify the symbols, notes, and terms used in sketching and on piping and structural drawings.
_____ 2. Demonstrate the ability to interpret piping and structural blueprints.

Piping Level/Transit (PPV 1443)

_____ 1. Demonstrate the use of levels and transits.
_____ 2. Demonstrate the ability to measure and record various measurements.

Advanced Plumbing Lab (PPV 1743)

_____ 1. Demonstrate the ability to safely install various commercial components and fixtures in accordance with required codes.

Sketching (PPV 1323)

_____ 1. Demonstrate the ability to sketch piping objects.
_____ 2. Demonstrate the ability to read different scales used on piping drawings.
_____ 3. Demonstrate the ability to do freehand lettering.
_____ 4. Demonstrate the ability to sketch piping drawings.

Tacking, Brazing, and Burning (PPV 1213)

_____ 1. Demonstrate the ability to safely set up and use the electric arc machine and the oxyacetylene torch.
_____ 2. Demonstrate the ability to safely cut various shapes on steel and pipe.
_____ 3. Demonstrate the ability to safely tack weld plate with the use of various rods and positions.
_____ 4. Demonstrate the ability to safely tack weld pipes in different positions.
_____ 5. Demonstrate the ability to safely prepare, solder, braze, and test various joints.

Rigging and Signaling (PPV 1812)

_____ 1. Demonstrate the ability to safely use the techniques of signals, riggings, and lifting.

Special Project in Plumbing (PPV 191(1-3))

_____ 1. Develop a written plan which details the activities and projects to be completed.
_____ 2. Assess accomplishment of objectives.
_____ 3. Utilize and follow a set of written guidelines for the special project.

Work-based Learning in Plumbing (PPV 192(1-6))

_____ 1. Apply technical skills needed to be a viable member of the work force.
_____ 2. Apply skills developed in other program area courses.
_____ 3. Apply human relationship skills.

_____ 4. Apply and practice positive work habits and responsibilities.
_____ 5. Work with instructor and employer to develop written occupational objectives to be accomplished.
_____ 6. Assess accomplishment of objectives.
_____ 7. Utilize a set of written guidelines.